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THE GENITOURINARY SYSTEM



ON THE AUTOBIOGRAPHY OF HUGH YOUNG

Grandson of a colonel in the Republic of Texas and son of a general in the Confederate States of America, Hugh Hampton Young was born at San Antonio, Texas, in 1870. During his life of 75 years, Young distinguished himself as the father of modern urology in the United States of America, founding the Brady Urology Institute at the Johns Hopkins Hospital in 1915. But apart from writing four medical textbooks, Young at age 70 published a superb autobiography (1940) that contains captivating recollections of his life, work, and times.

When news of Young's intent to accept a job as an engineer at \$75 a month reached his father in San Antonio in 1891, the general sent this telegram: "Resign at once and enter the University of Virginia." There Young obtained his B.A., M.A., and M.D. in four years and returned to San Antonio to practice medicine:

After saying good-by to the people of Albemarle County, who had been so kind to me at the university, I sold my furniture and returned to my home in San Antonio. The newspapers had carried an account of the graduation and had even stressed the three degrees acquired in four years, but no one guessed how little practical medicine I knew. One of my old friends told me that a friend of his had something wrong with her and he wanted me to make an examination and operate. He remarked that he would not trust the old fogies in San Antonio to do the operation, but that he would trust her to me with my modern, scientific knowledge of surgery. Fully aware of my shortcomings and that San Antonio had excellent surgeons, still I could not bring myself to tell him the truth.

After seeing the patient and palpating the uterus, I made out that the lower portion was greatly enlarged and should be cut off, but what the proper operation was I hadn't

the slightest idea. I told them a surgical operation was necessary and that I should be glad to take charge of the case, but as I was just starting in practice, it would be better for all concerned if I called in Dr. Cupples, just to prevent criticism. Asserting that he saw no reason for bringing in an old-timer, my friend consented. Dr. George Cupples had graduated at the universities of Edinburgh, London, and Paris, but on account of a tuberculous sister had left Europe and come to West Texas, hoping that the dry climate could cure her. He had done some of the first great surgical operations in the United States. Examining the patient, Dr. Cupples said, "This is a case for Schroeder's operation, which, as you know, removes this enlarged uterine neck obliquely and, by an excellent plastic closure, restores the uterus to normal." Simply saying that I agreed with him, I asked whether he would kindly assist me. The old gentleman said, "I wouldn't do this for anyone else, but your father is my dearest friend and I'll do it for his son."

I asked two other distinguished doctors to help me at the operation. A knife was handed to me. I held it aloft. Then, saying, "In your august presence, Dr. Cupples, I could not think of doing this operation," I pushed the knife into his hands. He expressed pleasure at my pretty speech and did a beautiful operation. I was saved. (Young, 1940)

Young collected \$40 from the patient and bought a train ticket to Baltimore where he began to learn his art.

One of the chief misfortunes of medical biographies is that they are often contrived for the lay reader, neglecting to describe scientific achievements in sufficient detail. Young's autobiography caused a shock in the medical community because he explicitly described his practice, discoveries, and achievements, including illustrations of human anatomy, instruments, and surgical procedures. He was a pioneer in prostatectomy and presents superbly the suprapubic, perineal, and transurethral approaches that he mastered. Young believed that the way to assure continued study of medicine was to write papers, and he wrote over 300 articles and 5 books. "The urge to pursue interesting problems and to write and lecture about them has been an ever present motive force," he wrote. "In fact, if two or three weeks go by without my being engaged in the preparation of some manuscript I have a distinct feeling of unrest." Young also founded the *Journal of Urology* in 1917 and edited it until his death in 1945.

Young was a glamorous, impeccably dressed man with a passion for opera, fine art, books, vintage wine, hunting, and fishing. He was a showman in the operating room, but never lost his temper or raised his voice. James H. Semans, a former resident of Young's, recalled:

On a particularly complicated case, and one of the rare occasions of death in the operating room, he gathered his audience together, drew a sketch of the operation, and labeled it "A Tale of Errors. H.H.Y." He was ashen gray; but was not one to dwell on failure and returned to his dapper self by the following day. (Semans, 1975).

Many eminent people came under the care of Young, including President Woodrow Wilson, "Diamond Jim" Brady, who financed the Brady Urological Institute, and H. L. Mencken, who read the manuscript of Young's autobiography and advised him not to change a thing.

—CHARLES STEWART ROBERTS

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An Overview of the Genitourinary System

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The goal of the clinical evaluation of the genitourinary system is the diagnosis of disorders and diseases of the entire urinary tract and the male genital tract. From the production of urine by the nephrons to the eventual elimination of urine via the external urethral meatus, malfunctions of the urinary tract may become manifest in a variety of ways. This transport of urine to the outside embodies the most important function of the kidneys, ureters, bladder, and urethra. Primary malignant tumors or infections of the urinary organs may not necessarily cause obstruction of the urinary tract. Most other common urologic diseases do cause obstruction, and are treated with a view toward relief or prevention of nephron damage resulting from obstruction of the normal flow of urine.

The functioning of the bladder as a storage reservoir that empties efficiently may be disturbed by obstruction, bladder irritation, or neuromuscular disease. Voiding dysfunction creates a unique set of complaints that requires a careful history in order to shorten the list of differential diagnoses.

The male genital tract includes organs responsible for the production and transportation of spermatozoa, the secretion of sex hormones, and the achievement of erections. Although sperm production and transport may be impaired and erectile dysfunction may be present, most patients present for evaluation of the male genital tract because of inflammatory processes and tumors of these organs. The interaction between the urinary tract and male genital organs, such as the prostate, often creates diagnostic challenges for the clinician.

History

Pain

Pain that originates from the kidney is usually localized to the ipsilateral costovertebral angle and flank (Chapter 182). Most renal pain is caused by rapid stretching of the renal capsule. The tension on the renal capsule may be secondary to parenchymal edema associated with infection or trauma, or caused by acute ureteral obstruction with relatively sudden distention of the renal pelvis. Conditions that cause a gradual stretching of the capsule, such as slowly progressive ureteral obstruction and renal tumors, usually cause little pain. Renal pain is often associated with nausea, vomiting, and abdominal distention due to the autonomic innervation that the kidney shares with the gastrointestinal tract, as well as secondary inflammation of the posterior peritoneum. Furthermore, pain in the flank often radiates into the lower abdominal quadrants and groin areas. Since the kidney shares common embryologic origins with the testes, testalgia may accompany the flank pain or exist alone with minimal associated complaints referable to the kidney region.

Discomfort arising from the lower urinary tract is usually

associated with voiding symptoms. Suprapubic pain may be caused by cystitis and prostatitis, but rarely occurs as the only complaint in either disorder. Bladder or prostate inflammation, as well as urinary retention, may cause radiation of pain to the lumbosacral region or perineum. Men with chronic prostatitis, for example, often complain of pain in the glans penis or a perineal pressure sensation described as "sitting on a golf ball."

Testicular pain (Chapter 186) is usually due to inflammation, trauma, or ischemia. Epididymitis and spermatic cord torsion, for example, are the most common etiologies of acute scrotal pain. Remember that disease processes in the retroperitoneum, including those of the kidneys, can cause referred pain to the testes. Primary diseases in the scrotum likewise may cause nausea and radiation of pain into the ipsilateral groin, lower abdomen, and flank. Testis tumors rarely cause scrotal pain and are usually identified by the patient or physician as a painless mass. The scrotal discomfort associated with a varicocele is usually a heavy, pulling sensation similar to that of an inguinal hernia.

Voiding Symptoms

Complaints referable to changes in voiding habits can usually be categorized as irritative voiding symptoms, obstructive voiding symptoms, and incontinence. These symptom categories provide a valuable framework for the pursuit of a group of differential diagnoses, even though there may be considerable overlap among these symptom categories. The bladder should be viewed as a bag of smooth muscle designed to store urine and empty its contents completely. Failure to store and/or failure to empty yield the symptoms of voiding dysfunction.

Symptoms of bladder irritation may be caused by inflammation, infection of the bladder and prostate, or abnormal innervation of the bladder and its sphincteric mechanism. The symptoms include frequency, urgency, dysuria, and suprapubic pain (Chapter 181). The frequent, precipitous urge to empty the bladder leads to voiding relatively small volumes of urine. If the urgency is severe, urge incontinence occurs in which the strong detrusor contraction cannot be inhibited long enough to make voiding convenient. Dysuria usually refers to pain in the urethra with voiding, but may include suprapubic or perineal pain with voiding as well. Any disorder that irritates the bladder mucosa, intrinsically or extrinsically, will cause these symptoms.

Obstructive voiding symptoms are caused by the obstruction of the flow of urine from the bladder. The most common etiology in men is benign prostatic hyperplasia. The syndrome of obstructive symptoms is, therefore, often called prostatism. Men may also have the same symptoms in the presence of prostatitis, with resultant edema and bladder outlet obstruction, or urethral stricture. Women may have obstructive voiding symptoms as well, but the etiology is

more often neurogenic or psychologic than on the basis of anatomic obstruction. The symptoms include hesitancy, decreased stream force and caliber, straining to void, and a sensation of post void residual accompanied by "double voiding" to finish emptying the bladder. Frequency and nocturia may also be present due to inefficient emptying (Chapter 183).

The involuntary loss of urine is termed incontinence (Chapter 185). Different forms of incontinence imply various etiologies for the loss of control. The loss may be spontaneous and therefore not associated with an antecedent urge to void or physical activity. Stress urinary incontinence occurs with a sudden increase in intra-abdominal pressure, such as from coughing, laughing, sneezing, or lifting. This symptom alone implies anatomic or neuromuscular incompetence of the sphincteric mechanism. Urge incontinence occurs when the desire to void develops rapidly. Urine is lost because voiding cannot be voluntarily postponed. As with urgency, this symptom implies bladder irritation or abnormal innervation.

Hematuria

The appearance of blood in the urine (Chapter 184) is often frightening to the patient. As a sign of malignancy, the implication is understandably disturbing. Allaying this anxiety and reassuring the patient that exsanguination rarely occurs on the basis of hematuria should be the first steps in the physician's evaluation. The physician should also understand that only relatively small volumes of blood are required to make urine appear red.

Some specific questions should be answered in order to characterize the hematuria. Dark brown, tea-colored urine usually means that the source of bleeding is the kidney or ureter. Bleeding from either the bladder, prostate, or urethra usually yields bright red urine. This color difference depends on the exposure time of blood to the acidic pH of urine. Blood in the initial part of the voided stream usually has a source in the prostate or urethra. Terminal hematuria usually implies the bleeding is from the bladder, as emptying is completed. Total hematuria, or blood throughout the voided stream, is usually due to upper urinary tract bleeding from the kidneys or ureters. The presence of clots implies active bleeding or urinary stasis at the site of bleeding.

The presence or absence of pain with voiding has different implications. Painful hematuria is that associated with abdominal pain, flank pain, suprapubic pain, or dysuria. The etiology of hematuria with discomfort of these types is likely benign, and this hematuria is usually due to a urinary infection or obstructing calculus. Painless hematuria, in contrast, is more likely related to malignancy in the urinary tract.

Characterization of hematuria as a complaint serves as a guide in building a list of differential diagnoses. The above associations are not absolutes and a complete diagnostic evaluation is carried out in all patients.

Microscopic hematuria should receive the same complete investigation as gross hematuria, because the amount of bleeding is not directly related to the severity of the cause. The patient's age, general health, and other associated complaints and clinical findings should be considered in formulating a diagnostic plan.

Erectile Dysfunction

A thorough history is of utmost importance in the evaluation of male erectile dysfunction (Chapter 187). This part of the evaluation alone may yield the final diagnosis. A history of medical diseases such as diabetes mellitus or renal disease, or surgical problems such as atherosclerotic peripheral vascular disease, may immediately identify potential causes of impotence. The list of current and previous medications should be reviewed carefully. Regardless of the presence of previous illnesses, the nature of the patient's complaints should be clearly defined at the beginning.

Questions regarding the time course of onset and settings in which dysfunction occurs are answered first. A rapid onset after a personally tragic event, for example, may imply psychogenic impotence. A gradual progression is usually seen with organic causes. Potency with one sexual partner and impotence with another implies psychogenic impotence. A concomitant loss of libido as well as erectile function raises suspicion of a sex hormone problem.

Most adult men have several erections during a night's sleep. A history of the presence of nocturnal or early morning erections in a patient complaining of impotence is a clue to a psychogenic etiology.

Differentiation should be made between the inability to achieve an erection, the premature loss of erection before orgasm, and premature ejaculation.

The patient should be questioned regarding present or past pain with erections or ejaculation and angulation of the erect penis. Peyronie's disease, for example, initially causes angulation of the erect penis with eventual progression to impotence.

Physical Examination

External Genitalia

Evaluation of the external genitalia in males (Chapter 189) includes examination of the penis, scrotum, and scrotal contents. This should be performed in a warm room to allow maximum dartos and cremasteric muscle relaxation. This area should be examined initially with the patient supine and then standing upright. Many physical findings may be more easily identified in one position or the other. While examining the genitalia, some estimation of androgenic stimulation and masculinization can be gained by noting the condition of the skin in this area as well as the amount and distribution of pubic hair.

Examination of the penis includes the skin, corporal erectile bodies, and urethral meatus. It should be noted whether the patient is circumcised or uncircumcised. The ease with which a redundant prepuce is retracted is assessed. The entire penile skin, including that beneath the prepuce, should be examined for ulcers, warts, rashes, or other lesions. The size and position of any skin lesion should be

Table 180.1
Instruments Needed for Examining the Male Genitourinary System

Gloves
Lubricant
Penlight

described along with the degree of tenderness to palpation and fixation to subcutaneous tissue. If penile skin lesions are found, correlation of palpable deep or superficial inguinal adenopathy should be made at that time. The corpus cavernosum and corpus spongiosum should be palpated for masses, areas of induration, tenderness, or skin fixation. The position of the external urethral meatus should be noted along with a comment about the adequacy of its size. Examination for urethral discharge or urethral mucosal lesions near the meatus should also be carried out by everting the lips of the meatus.

The entire scrotal skin should be examined for evidence of inflammation, ulceration, or solid mass. Other than the skin, the scrotal wall is composed of the dartos muscle with its investing fascia and the parietal layer of the tunica vaginalis. The dartos muscle contracts in response to cool temperature as a warming mechanism for the testes.

Each testis and its adnexa should be examined by palpation. The size and consistency of the testes should be noted with careful documentation of any areas of mass effect or induration. The normal testis is smooth and of firm consistency. In the normal state, the epididymis, which lies vertically along the posterior and lateral aspect of the testis, should be easily delineated from the testis by palpation. The size of any masses, areas of induration, or areas of tenderness should be described along with a notation about their location in the head (upper pole), body, or tail (lower pole) of the epididymis. If induration or tenderness is found, it is important to note whether overlying skin erythema, edema, or fixation is present.

If a scrotal mass is identified, documentation should be made whether or not the mass transilluminates. Examination in a dark room with a small, strong light source is required. Although some testicular tumors have an associated hydrocele, most masses in the scrotum that transilluminate are benign.

The spermatic cord contents should be examined. The vas deferens is easily palpable and nontender in normal males. The spermatic cord can be palpated above the level of the external inguinal ring, where a routine examination to rule out inguinal hernia is made. A varicocele is a mass of dilated veins in the spermatic cord tributaries of the pampiniform plexus. Varicoceles may become evident only

after repeated Valsalva maneuvers, which will cause the veins to distend.

The scrotum should be envisioned as an annex of the abdomen, since its contents originated in the abdomen. The testes are housed in the adult scrotum to provide a cooler environment for spermatogenesis, sperm maturation, and transport.

Prostate

The prostate gland is a heart-shaped organ whose posterior surface can be palpated through the anterior wall of the rectum. The apex of the prostate, near the anal verge, is the narrowest and most distal extent. The base, or proximal extent, is at the junction of the bladder neck with the prostate. The best position of the patient for digital examination is standing, with the hips flexed 90 degrees, allowing him to lean forward onto an examination table or chair. The legs should be spread wide apart with the toes pointed inward. This position allows maximal relaxation of the anal sphincter and thereby facilitates a thorough but comfortable examination for the patient. In this position gravity pulls the prostate down for easier palpation. If the patient is not able to get out of bed, then digital examination should be done alternatively in the modified lithotomy position. This position is similar to that used for bimanual pelvic examination in a female.

The size and consistency of the entire prostate should be noted along with any focal changes in consistency. A nodule or indurated area suggests carcinoma. The diameter of any abnormal area should be estimated and a drawing made of these findings. The prostate gland should be symmetric with respect to the median sulcus, which is a midline groove on its posterior surface. Any asymmetry, despite normal consistency, is suggestive of carcinoma and warrants further investigation. Except in extremely large prostate glands, the lateral sulcus on each side should be palpable without a change in consistency or depth of the sulcus.

The seminal vesicles and ampulla of the vas deferens are not palpable in their normal state. A mass or area of induration superior to the prostate on digital rectal examination, therefore, warrants further investigation.